

Amendments to the Specification:

Please replace the paragraph beginning at page 1, line 1, with the following rewritten paragraph:

This invention relates to a method for the production of acrylic acid, for example, which method comprises preparing the chilled coolant by utilizing the latent heat generated during the gasification of propylene and/or propane as the raw material for the production of acrylic acid and circulating the chilled coolant to the heat exchangers being used in the apparatus for the production of acrylic-acrylic acid, and to the apparatus for the production of acrylic acid which is suitable for the method mentioned above.

Please replace the paragraph beginning at page 2, line 24, with the following rewritten paragraph:

In this case, a part of the bottom liquid in the acrylic acid absorbing column 5 is introduced into the circulation cooler 9 attached to the acrylic acid absorbing column and cooled by exchanging heat with the liquid coolant supplied from a part of liquid coolant supplying system 1 and then circulated to the acrylic acid absorbing column 5. Incidentally, the acrylic acid absorbing column 5 is generally installed with the absorbing solvent cooler 8 adapted to cool the acrylic acid absorbing solvent 21 for the purpose of enhancing the efficiency of acrylic acid absorption. The distillate from the top of the solvent separating column 6 is condensed in the condenser 10 attached to the solvent separating column 6 with the liquid coolant supplied from a part of the liquid coolant supplying system 1, thereby ~~recovering~~ recovering the solvent 22. Similarly, the distillate from the top of the refining column 7 is condensed in the condenser 11 attached to the refining column 7 with the liquid coolant supplied from a part of the liquid coolant supplying system 1, thereby obtaining the acrylic acid 18. The liquid coolant resulting from heat exchange can be supplied to the methacrylic acid and/or (meth)acrylic esters plant 12, subjected to heat exchange therein, and then put to use. In any event, the liquid coolant lines are provided for the purpose of allowing circulation of this liquid coolant from these heat exchangers to the liquid coolant supplying system 1. Incidentally, the acrylic acid absorbing column 5 discharges the waste gas 20 through the top thereof.

Please replace the paragraph beginning at page 14, line 4, with the following rewritten paragraph:

In this invention, the chilled coolant having the temperature thereof adjusted by the refrigerator 13 is used as the liquid coolant for at least one of the heat exchangers attached to the plant for producing acrylic acid. These heat exchangers include the absorbing solvent cooler 8 attached to the acrylic acid absorbing column 5, the circulation cooler 9 attached to the acrylic acid absorbing column 5, the condenser 10 attached to the solvent separating column 6 and the condenser 11 attached to the refining column 7, for example.

Please replace the paragraph beginning at page 16, line 13 through page 17, line 9, with the following rewritten paragraph:

The process for producing acrylic acid usually involves the acrylic acid refining column 7 in addition to the acrylic acid absorbing column and the solvent separating column mentioned above. When the acrylic acid refining column 7 is involved in the process, the chilled coolant mentioned above may be used as the liquid coolant for the heat exchanger attached to the acrylic acid refining column 7 such as, for example, the condenser 11 attached to the refining column 7. When the chilled coolant is circulated to such a heat exchanger, the temperature thereof is properly in the range of 20 - 35°C, preferably 20 - 30°C. The vapor of acrylic acid is distilled from the acrylic acid refining column 7 through the top thereof and subsequently cooled by the condenser 11 attached to the refining column 7 to obtain acrylic acid. Meanwhile, the liquid 19 containing the by-product is recovered through the bottom of the column. Incidentally, the liquid coolant which has utilized in the condenser 10 attached to the solvent separation column or the condenser 11 attached to the refining column 7 is passed through the line 7 and the line 8 and mixed with the flow through the line 6 and returned to the liquid coolant supplying system 1 and reused as the liquid coolant. When the apparatus for the production of acrylic acid mentioned above is connected to the methacrylic acid and/or (meth)acrylic esters plants 12, the liquid coolant mentioned above may be supplied as the liquid coolant for heat exchange in the plant 12 and the liquid coolant which has undergone this heat exchange advanced through the line 9, combined with the flow through the line and returned again to the liquid coolant supplying system 1 and reused as the liquid coolant.

Please replace the paragraph beginning at page 17, line 10, with the following rewritten paragraph:

One example of the chilled coolant used in the process for producing acrylic acid by the series of operations resorting to the reactor 4, acrylic acid absorbing column 5, solvent separating column 6, and refining column 7 has been installed. This invention allows the chilled coolant to be used in such heat exchangers installed in the plants other than the plant for producing acrylic acid and the plants further connected to the acrylic acid plant such as, for example, the methacrylic acid and/or (meth)acrylic esters plants 12. When the amount of the heat of the chilled coolant calculated from the amount of the chilled coolant obtained by gasification is in excess of the total amount of the heat required for cooling in the heat exchangers attached to the process for producing acrylic acid, when the amount of the heat of chilled coolant is in excess amount because the chilled coolant has been further cooled by the refrigerator 13, and when the chilled coolant usable for cooling is in excess amount because it has been used only in a part of the heat exchangers involved in the process for producing acrylic acid, these excess of the chilled coolant can be effectively utilized in the plants mentioned above instead of being wasted. Moreover, the use of the chilled coolant results in not only reduction of energy consumption for cooling but also stabilizing the process of production by effective utilization of the latent heat generated by the gasification of propylene. For example, part of the chilled coolant from the line 3 can be circulated to and used in the heat exchangers attached to the methacrylic acid and/or (meth)acrylic esters plants 12. The chilled coolant which has undergone heat exchange in this plant may be advanced through the line 9 and mixed with the flow through the line ~~6~~ 106. Particularly, when the acrylic acid is further esterified to produce the acrylic esters, the chilled coolant supplied to and used in the heat exchangers incorporated in the apparatus for producing esters brings about the advantage of simplifying the installation of piping for the transfer of the chilled coolant.

Please replace the paragraph beginning at page 23, line 4, with the following rewritten paragraph:

Then, the acrylic acid-containing gas ~~20-19~~ emanating from the reactor 4 is supplied to the acrylic acid absorbing column 5. In the absorbing column 5, the absorbing solvent 21 is

supplied thereto via the absorbing solvent cooler 8 and utilized therein to prepare the acrylic acid-containing solution. The waste gas 20 emanating from the top of the absorbing column 5 is either discarded or recycled. By using the cooled acrylic acid absorbing solvent 21, it makes possible to improve the efficiency of acrylic acid absorption in the acrylic acid absorbing column 5.

Please replace the paragraph beginning at page 26, line 16, with the following rewritten paragraph:

When the plant is provided with lines so installed that the chilled coolant used in any of the heat exchangers incorporated in the plant may be recovered in the liquid coolant tank 27, it makes possible to store the used chilled coolant in the liquid coolant tank 27 and transfer the liquid coolant from the tank using the liquid coolant transfer pump 28 which is installed in the line 11 connected to the tank. When the liquid coolant tank 27 is disposed as described above, the pressure accumulating in the line for the liquid coolant transfer and the non-condensable gas possibly leaking in a minute amount into the liquid coolant may be separated. Particularly since the brine can be a chilled coolant of a lower temperature than water, the liquid coolant may be circulated only partly to the evaporator 3 and used as the chilled coolant instead of being wholly circulated to the evaporator 3. For example, part of the liquid coolant flowing from the liquid coolant transfer pump 28 through the line 11 is circulated to and cooled in the evaporator 3, forwarded via the line 2 which is the line of the chilled coolant ~~to~~from the evaporator 3, and combined with the flow through the line 11. The chilled coolant which has been obtained by being cooled as described above has a temperature different from the temperature of the liquid coolant flowing through the line 11 and the line 2. When the line 12 is laid subsequently to the point of confluence, the chilled coolant can be forwarded through the line 12 directly to the circulation cooler 9 attached to the acrylic acid absorbing column and used therein as the chilled coolant. The chilled coolant may be transferred through the line 12 to the refrigerator 13, further cooled therein, and thereafter forwarded to the circulation cooler 9 attached to the acrylic acid absorbing column and used as the chilled coolant therein.

Please replace the paragraph beginning at page 29, line 15, with the following rewritten paragraph:

As the "means for using the chilled coolant in heat exchangers attached to the apparatus for producing acrylic acid or acrolein," the piping connected from the evaporator 3 to various heat exchangers, the lines 2, 3, and 11, and various heat exchangers may be cited. The pipe lines may include temperature adjusting means such as the liquid coolant thermocontroller ~~26~~ 23 for the chilled coolant and the gas flow rate controller 25 as means for flow rate adjustment and they may be additionally provided with the refrigerator 13 for further cooling the chilled coolant and the liquid coolant thermocontroller ~~26~~ 23.

Please replace the paragraph beginning at page 31, line 13, with the following rewritten paragraph:

This chilled coolant was circulated to and used in absorbing solvent cooler 8, the condenser 10 attached to the solvent separating column, and the condenser 11 attached to the refining column. The used chilled coolant was introduced to the liquid coolant supplying system 1 and reused as liquid coolant. To the circulation cooler 9 attached to the acrylic acid absorbing column, the chilled coolant having the temperature of 27°C was directly supplied through the line ~~2~~ 102.